

Undergraduate Degrees

Overview

The numbers and percentages of women and minorities earning science and engineering associate's and bachelor's degrees were at all-time highs in 1998. Close to half of all S&E bachelor's degrees were earned by women in 1998, and in some S&E fields, women earned far more than half of the bachelor's degrees. On the other hand, in a few S&E fields, women earned far less than half of the baccalaureate degrees awarded, and their numbers and percentages were increasing very slowly or not at all. The numbers of bachelor's degrees earned by Asians, blacks, Hispanics, and American Indians in the 1990s increased in both S&E and non-S&E fields. In contrast, the numbers of S&E and non-S&E bachelor's degrees earned by white males decreased.

This chapter examines undergraduate degree conferral at both 2- and 4-year institutions. It also examines undergraduate debt.

Associate's degrees

Only 13 percent of all associate's degrees are awarded in science and engineering. (See appendix table 3-1.) Although an associate's degree is the terminal degree for some people, others continue their education and subsequently earn higher degrees. About 14 percent of academic year 1997/98 S&E bachelor's degree recipients had previously earned an associate's degree. (See text table 3-1.)

Women

The number of associate's degrees in S&E awarded to women rose from 17,571 in 1990 to 22,931 in 1998; concurrently, the number awarded to men dropped from 55,177 to 48,075. (See appendix table 3-1.) Women earned 32 percent of the associate's degrees in S&E in 1998, up from 24 percent in 1990. In 1998, they earned from 45 to 67 percent of the associate's degrees awarded in computer science, the biological sciences, the physical sciences, psychology, the social sciences, and interdisciplinary sciences; they earned only 15 percent of those awarded in engineering and engineering technologies. (See appendix table 3-1.)

The largest numbers of S&E associate's degrees are awarded in computer science and engineering technologies. From 1990 to 1998, the number of associate's degrees in computer science awarded to either men or women

Text table 3-1

Percentage of academic year 1997/98 S&E baccalaureate recipients who had previously earned an associate's degree, by sex, race/ethnicity, and disability status: 1999

Sex, race/ethnicity, and disability status	Percent
Total.....	14
Male.....	13
Female.....	15
White, non-Hispanic.....	14
Asian/Pacific Islander.....	8
Black, non-Hispanic.....	17
Hispanic.....	18
American Indian/Alaskan Native.....	37
Persons without disabilities.....	14
Persons with disabilities.....	24

SOURCE: National Science Foundation, Division of Science Resources Statistics, National Survey of Recent College Graduates.

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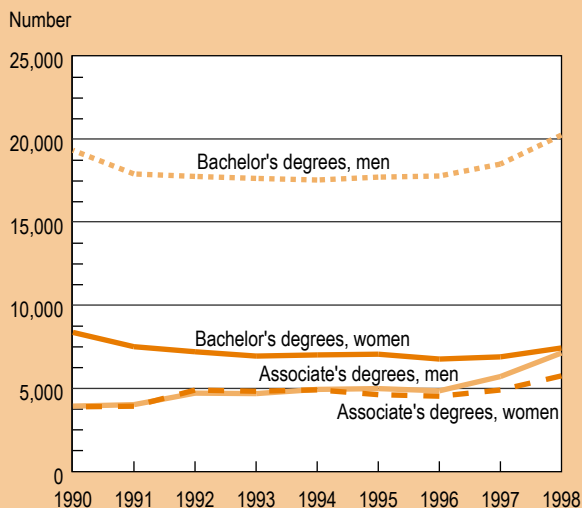
increased—particularly from 1996 to 1998—with the number of awards to men increasing faster than that for women. (See figure 3-1.) Concurrently, associate's degrees in engineering technologies decreased more rapidly for men than for women.

Minorities

In 1998, blacks earned 9 percent of all the associate's degrees awarded in science and engineering, Hispanics 8 percent, Asians 5 percent, and American Indians 1 percent.¹ In this context, note that, as mentioned in chapter 2, Hispanics and American Indians are more likely than other groups to enroll in 2-year colleges.

¹Data on race/ethnicity are collected only for U.S. citizens and permanent residents. Comparable data are not collected for students on temporary visas.

Figure 3-1
Bachelor's and associate's degrees awarded in computer science, by sex: 1990–98



SOURCE: Tabulations by National Science Foundation, Division of Science Resources Statistics; data from U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, various years.

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The number of associate's degrees in S&E increased for each racial/ethnic minority group and decreased for white students from 1990 to 1998. (See appendix table 3-2.) The number of associate's degrees earned in computer science increased for all racial/ethnic groups from 1990 to 1998; again, this was particularly notable in the 1996–98 period for most groups.

Minority women

In 1998, minority women earned a larger proportion of the associate's degrees in S&E awarded to their respective racial/ethnic group than did white women. Women earned 44 percent of the S&E associate's degrees awarded to American Indians, 38 percent of those to blacks, 36 percent of those to Hispanics, 34 percent of those to Asians, and 31 percent of those to whites. (See appendix table 3-3.)

In some S&E fields—the biological sciences, psychology, and the social sciences—women earned well over half of the associate's degrees awarded to their respective racial/ethnic group. In the physical sciences, the pattern held for all racial/ethnic groups except white women, who earned just less than half of the associate's degrees in this field. In computer science, women earned more than half of the associate's degrees awarded to blacks and American Indians.

Students with disabilities

As noted in the previous chapter, college students with disabilities are more likely to enroll in 2-year colleges than are those without disabilities. Similarly, students with disabilities earning bachelor's degrees are more likely than those without to have earned an associate's degree. Among S&E bachelor's degree recipients in 1997 and 1998, 24 percent of those with disabilities, compared with 14 percent of those without disabilities, had previously earned an associate's degree. (See text table 3-1.)

Bachelor's degrees

The baccalaureate is the most prevalent degree in science and engineering, accounting for 76 percent of all degrees awarded in S&E (NSF/SRS 2001). In 1998, as has been the case historically, about one-third of all bachelor's degree awards were earned in S&E fields. The total number of S&E bachelor's degrees awarded, as well as the total number of baccalaureate degrees awarded in non-S&E fields, increased between 1990 and 1998. (See appendix table 3-4.)

Women

The number of bachelor's degrees in S&E awarded to women increased from 140,012 in 1990 to 190,397 in 1998. (See appendix table 3-4.) Concurrently, the number of S&E bachelor's degrees awarded to men fluctuated around 200,000. (See figure 3-2.) Women earn more bachelor's degrees in non-S&E fields than do men; in 1998, they accounted for 60 percent of all such awards. (See appendix table 3-4.)

Women earn nearly half of all S&E baccalaureate awards. The percentage of bachelor's degrees in S&E awarded to women has been steadily increasing; in 1998, it reached 49 percent. (See appendix table 3-4.) Also, the share of bachelor's degrees awarded to women in almost all major S&E fields increased during the 1990s. Mathematics was one exception to this trend; in this field, women's share of baccalaureate awards hovered at around 46 percent from 1990 to 1998. Another exception was computer science: in this field, the number of awards dropped for both men and women from 1990 to 1996. The decline for women was greater, though, than for men; and over the 1990–98 period, the proportion of computer science bachelor's degrees awarded to women dropped from 30 percent to 27 percent. (See figure 3-1 and appendix table 3-4.)

In 1998, women earned almost three-fourths of the bachelor's degrees awarded in psychology and over half of those granted in the biological sciences and in most social sciences. They earned 47 percent of the bachelor's degrees

Women's Colleges

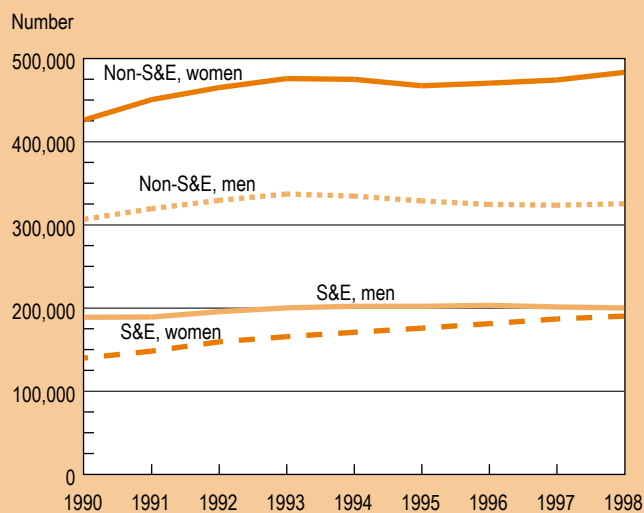
Women's colleges were founded in the mid- to late 19th century to promote and expand educational opportunities for women (U.S. Department of Education 1997). The number of women's colleges in the United States is declining; while there were 188 in 1989, there are now only 73. Several women's colleges have closed or merged in the last decade; others have become coeducational (Reisberg 2000). Because of their small size (most have fewer than 2,500 students), women's colleges are not a major source of bachelor's degrees for women; this is true both for bachelor's degrees in general and for bachelor's degrees in S&E. About 2 percent of all bachelor's degrees awarded to women were earned at women's colleges in 1998. (See appendix table 3-5.) Some women's colleges do, however, produce large numbers of female S&E graduates. For example, Spelman College is the top institution granting bachelor's degrees to black women in S&E. Women's colleges are also among the top baccalaureate-origin institutions for S&E doctorate recipients (see chapter 5).

International Comparison of Women's Undergraduate Degrees

Women earned a little more than half of first university degrees in all fields in Australia, Canada, France, Italy, Spain, the United Kingdom, and the United States. They earned less than half of all first university degrees in Germany, Japan, Korea, Mexico, and Turkey. (See appendix table 3-7 and "International Comparison of Women's Undergraduate Enrollment" in chapter 2 on undergraduate enrollment.)

Across countries with field of degree data, women earned roughly similar proportions of degrees in some fields. For example, women earned between 54 and 64 percent of life science degrees in all countries providing data, and from 6 to 21 percent of engineering degrees. In other fields—for example, the physical sciences, mathematics, the agricultural sciences, and the social sciences—there were greater differences in the percentage of degrees awarded to women by country. Women earned a higher percentage of mathematics/statistics/computer science degrees in Italy, Korea, and Turkey than in most other countries. On the other hand, they earned a much lower percentage of social science degrees in Turkey and Korea than in most other countries.

Figure 3-2
Bachelor's degrees awarded in S&E and non-S&E fields,
by sex: 1990–98



SOURCE: Tabulations by National Science Foundation, Division of Science Resources Statistics; data from U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, various years.

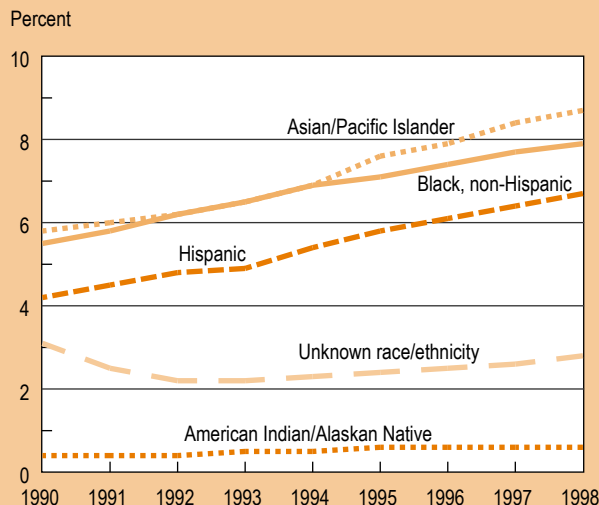
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in mathematics, 46 percent in chemistry, and 43 percent each in the agricultural and ocean sciences. Women earned approximately a third of the bachelor's degrees in several fields—the earth sciences (38 percent), astronomy (35 percent), chemical engineering (33 percent), and economics (32 percent). On the other hand, less than 20 percent of the bachelor's degrees awarded in 1998 in aerospace engineering, electrical engineering, mechanical engineering, and physics went to women. (See appendix table 3-6.)

Minorities

The numbers of bachelor's degrees earned by Asians, blacks, Hispanics, and American Indians in both S&E and non-S&E fields increased each year from 1990 to 1998. In contrast, the numbers of S&E and non-S&E bachelor's degrees earned by whites increased and then decreased in the 1990s, resulting in a small overall increase. (See appendix table 3-8.) In science and engineering as a whole and within S&E fields, both the numbers and percentages of degrees earned by nonwhite racial/ethnic groups have risen since 1990. (See figure 3-3 and appendix table 3-9.) More recent data on bachelor's degrees in engineering show continued increases in degree awards to Asians, Hispanics, and

Figure 3-3
Percentage of bachelor's degrees earned in S&E, by race/ethnicity: 1990–98



NOTE: Data on race/ethnicity are for U.S. citizens and permanent residents only and do not include students on temporary visas.

SOURCE: Tabulations by National Science Foundation, Division of Science Resources Statistics; data from U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, various years.

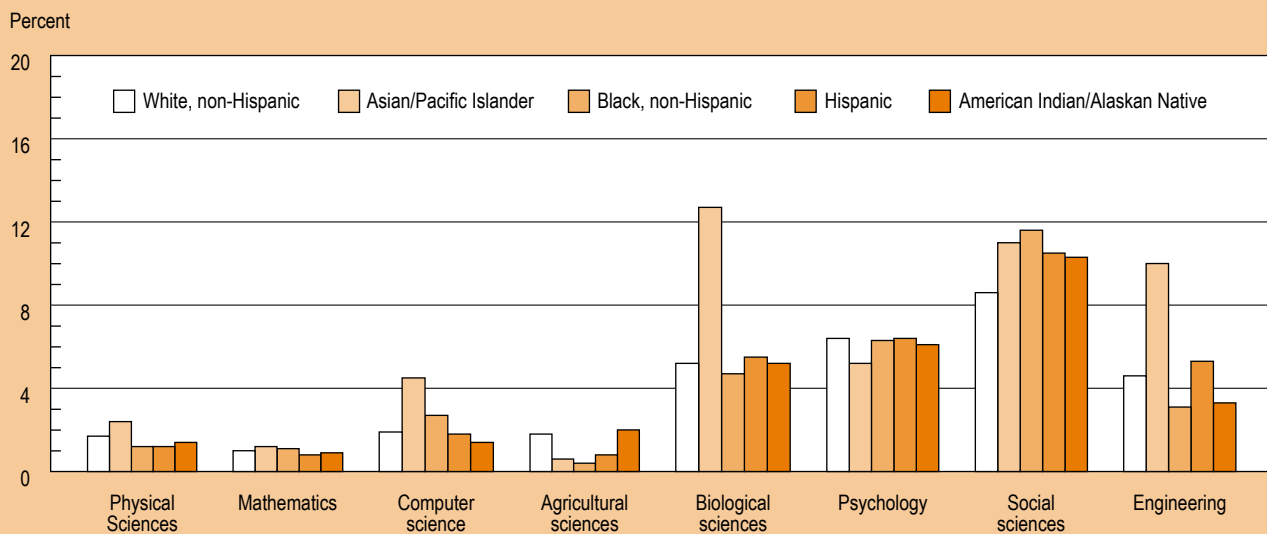
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American Indians. The number of bachelor's degrees earned by blacks in engineering, which increased from 1990 to 1997, has remained relatively stable over the last several years. (See appendix table 3-10.) The number of engineering bachelor's degrees earned by whites, which declined through the 1990s, increased in 2000.

Blacks, Hispanics, and American Indians earn roughly the same percentages of S&E bachelor's degrees as they do of non-S&E degrees. Blacks earned 8 percent of both the S&E and non-S&E bachelor's degrees awarded to U.S. citizens and permanent residents in 1998. Hispanics earned 7 percent of each, and American Indians earned less than 1 percent of each. In contrast, Asians earned 9 percent of S&E, but only 5 percent of non-S&E, bachelor's degrees in 1998. With the exception of Asians, for whom almost half of all bachelor's degrees received are in S&E, about one-third of all bachelor's degrees earned by each racial/ethnic group are in science and engineering.

The contrast in field distribution among whites, blacks, Hispanics, and American Indians on the one hand and Asians on the other is apparent within S&E fields as well. White, black, Hispanic, and American Indian S&E baccalaureate recipients share a similar distribution across broad S&E fields. For example, in 1998, between 10 and 12 percent of all baccalaureate recipients in each of these racial/ethnic groups earned their degrees in the social sciences, roughly 5 percent

Figure 3-4
Percentage of all bachelor's degrees awarded in various S&E fields, by race/ethnicity: 1998



NOTE: Data on race/ethnicity are for U.S. citizens and permanent residents only and do not include students on temporary visas.

SOURCE: Tabulations by National Science Foundation, Division of Science Resources Statistics; data from U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, various years.

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Where Minorities Earn Their Degrees

Some colleges and universities educate a disproportionate share of undergraduates who are members of racial/ethnic minorities. For example, America's historically black colleges and universities (HBCUs) continue to play an important role in educating and producing black S&E bachelor's degree recipients. In 1998, as in 1990, 29 percent of the blacks who received bachelor's degrees in S&E earned them at HBCUs. (See appendix table 3-12.) HBCUs awarded 52 percent of the bachelor's degrees received by blacks in the agricultural sciences, 43 percent of those in both the physical sciences and mathematics, and 42 percent of those in the biological sciences in 1998. (See appendix table 3-12.)

About one-third of S&E bachelor's degrees to Hispanics are earned at Hispanic-serving institutions (HSIs). Unlike HBCUs, the institutions classified as HSIs are updated each year. Among the criteria for inclusion as an HSI, as per the Higher Education Act of 1965, as amended, and 20 U.S.C. 1059c, are that the institution has at least 25 percent Hispanic full-time undergraduate enrollment and that at least 50 percent of its Hispanic students are low income. Hispanics are particularly likely to earn bachelor's degrees in the physical sciences and biological sciences at HSIs—47 percent of the physical science and 42 percent of the biological science bachelor's degrees earned by Hispanics were awarded by HSIs in 1998. (See appendix table 3-13.)

Almost all of the S&E bachelor's degrees for American Indians are granted by non-tribal colleges. Tribal colleges and universities (TCUs), first established in the late 1960s, are academic institutions created and chartered, for the most part, by one or more tribes (U.S. ED/NCES 1998). As of 1998, there were 30 TCUs, most of which were located on Indian reservations. Only six TCUs are 4-year colleges or universities; the rest are 2-year schools. Of the six TCUs that offer bachelor's degrees, two offer baccalaureates in S&E. In 1998, those two awarded 16 bachelor's degrees to American Indians in science and none in engineering; 13 of these degrees were in the social sciences. (See appendix table 3-14.)

in the biological sciences, and about 2 percent in computer science. Asian baccalaureate recipients earned higher proportions of their baccalaureates in the biological sciences and engineering. (See figure 3-4.) Differences among racial/ethnic groups are somewhat greater by detailed S&E fields. (See appendix table 3-11.)

Minority women

The numbers of bachelor's degrees awarded in science and engineering increased from 1990 to 1998 for women in each racial/ethnic group, rising from approximately 113,000 to 137,000 for whites; 8,000 to 16,000 for Asians; 10,000 to 19,000 for blacks; 6,000 to 14,000 for Hispanics; and 600 to 1,300 for American Indians. (See appendix table 3-15.) The numbers of bachelor's degrees granted to Asian, black, Hispanic, and American Indian men in S&E also increased during this period. In contrast, the number of bachelor's degrees awarded to white men dropped from approximately 158,000 in 1990 to 153,000 in 1998. (See appendix table 3-16.)

Within each racial/ethnic group in 1998, women accounted for a lower percentage of the bachelor's degrees in S&E than in non-S&E fields. In contrast to white and Asian women, however, black, Hispanic, and American Indian women earned more than half of the bachelor's degrees in S&E awarded to their respective racial/ethnic group in 1998. (See appendix table 3-17.)

Students with disabilities

The National Center for Education Statistics collects data on bachelor's or master's degree awards, but does not include measures of disability status. Further, as noted in the sidebar on the "Availability of Institutional Data on Students With Disabilities," in chapter 2, colleges and universities do not maintain data in their central records that identify students with disabilities. Therefore, degree data collected from colleges and universities are not reported by disability status.

Debt at graduation

With regard to undergraduate debt, little difference existed between men and women, but some differences existed among racial/ethnic groups and between students with and without disabilities, in 1999. (See appendix table 3-18.) Overall, 60 percent of S&E bachelor's recipients in 1997 and 1998 had borrowed money to finance their undergraduate education. Similar percentages of men and women (60 and 61 percent, respectively) reported still having undergraduate debt in 1999, and the amounts owed were also similar (between \$13,500 and \$14,300). Blacks had a higher average debt than whites, Asians, and Hispanics. S&E bachelor's degree recipients with disabilities were more likely than those without to report having borrowed, but the average amounts of debt (among those with debt) in 1999 did not differ between these two groups.

References

- National Science Foundation, Division of Science Resources Studies (NSF/SRS). 2001. *Science and Engineering Degrees: 1966–98*. NSF 01-325. Arlington, VA.
- Organisation for Economic Co-operation and Development (OECD). 2000. *Education at a Glance*. Paris.
- Reisberg, L. 2000. A crossroads for women's colleges. *The Chronicle of Higher Education* 47(11).
- U.S. Department of Education (U.S. ED). 1997. *Women's Colleges in the United States: History, Issues, and Challenges*. By I. Harwarth, M. Maline, and E. DeBra. Washington, DC: U.S. Government Printing Office.
- U.S. Department of Education, National Center for Education Statistics (U.S. ED/NCES). 1998. *American Indians and Alaska Natives in Postsecondary Education*. By D. M. Pavel, R. R. Skinner, E. Farris, M. Cahalan, and J. Tippeconnic. NCES 98-291. Washington, DC: U.S. Government Printing Office.